

AMENDMENTS TO THE CLAIMS:

1. (Currently amended) A multiplexing method of multiplexing communication signals from communication signal transmitting sections and transmitting a multiplexed signal to a multiplexed signal receiving section, comprising ~~the steps of:~~
 - adding, to each of the communication signals, an identification address preassigned to a predetermined signal identifying section through which a communication signal passes in a multiplexing system including the communication signal transmitting section and the multiplexed signal receiving section and outputting each of the communication signals;
 - extracting the identification address from each output signal; and
 - multiplexing the respective communication signals on the basis of the extracted identification addresses.
2. (Currently amended) A method according to claim 1, wherein the communication signal includes ~~[[is]]~~ a PPP packet created for each Internet subscriber apparatus, and the identification address includes ~~[[is]]~~ a MAC address.
3. (Currently amended) A demultiplexing method of receiving a multiplexed signal obtained by multiplexing a plurality of communication signals from a multiplexed signal transmitting section, demultiplexing the signal into communication signals, and transmitting the demultiplexed communication signal to a communication signal receiving section, comprising ~~the steps of:~~
 - adding, to each of the communication signals, an identification address preassigned to a predetermined signal identifying section through which a communication

signal passes in a multiplexing system including the multiplexed signal transmitting section and the communication signal receiving section, and outputting each of the communication signals;

extracting the identification address from the output signal; and

demultiplexing the multiplexed signal for each of the communication signals on the basis of the extracted identification address.

4. (Currently amended) A method according to claim 3, wherein the communication signal includes ~~[[is]]~~ a PPP packet created for each Internet subscriber apparatus, and the identification address includes ~~[[is]]~~ a MAC address.

5. (Currently amended) A demultiplexing method of demultiplexing a multiplexed signal obtained by multiplexing a plurality of packets ~~packet~~ into packets, comprising ~~the steps of:~~

extracting an IP address from each packet in the received multiplexed signal; and

demultiplexing the multiplexed signal into PPP packets on the basis of the extracted IP addresses.

6. (Original) A multiplexing apparatus which is connected to communication paths of communication signal transmitting sections, multiplexes communication signals from the communication paths, and transmits a multiplexed signal to a multiplexed signal receiving section through a multiplex communication path, comprising:

address extracting means for extracting an identification address, for each communication signal, which is added to the communication signal received from each of

the communication paths and preassigned to a predetermined signal identifying section through which the communication signal passes in a multiplexing system including the communication signal transmitting section and the multiplexed signal receiving section; and

multiplexing means for multiplexing the communication signals received from the respective communication paths on the basis of the identification addresses set for the respective communication signals extracted by said address extracting means.

7. (Currently amended) An apparatus according to claim 6, wherein the communication signal includes [[is]] a PPP packet created for each Internet subscriber apparatus, and the identification address includes [[is]] a MAC address.

8. (Original) A demultiplexing apparatus which is connected to a multiplexed signal transmitting section through a multiplex communication path, demultiplexes a multiplexed signal received from the multiplex communication path, and transmits demultiplexed communication signals to a communication signal receiving section through communication paths for the respective communication signals, comprising:

address extracting means, connected to the multiplex communication path, for extracting an identification address, for each of the communication signals, which is added to each of the communication signals in the multiplexed signal received from the multiplex communication path and preassigned to a predetermined signal identifying section through which a communication signal passes in a demultiplexing section including said multiplexed signal transmitting section and said communication signal receiving section; and

demultiplexing means for demultiplexing the multiplexed signal into the respective communication signals on the basis of the identification addresses of the respective communication signals which are extracted by said address extracting means.

9. (Currently amended) An apparatus according to claim 8, wherein the communication signal includes [[is]] a PPP packet created for each Internet subscriber apparatus, and the identification address includes [[is]] a MAC address.

10. (Original) A demultiplexing apparatus which is connected to a multiplex communication path through which a multiplexed signal obtained by multiplexing packets addressed to subscriber apparatuses is transmitted, demultiplexes the multiplexed signal received from the multiplex communication path, and outputs each demultiplexed communication signal, comprising:

address extracting means, connected to the multiplex communication path, for extracting an IP address of each packet in the multiplexed signal received from the multiplex communication path; and

demultiplexing means for demultiplexing the multiplexed signal into the respective packets on the basis of the IP addresses of the respective packets extracted by said address extracting means.

11. (Currently amended) An access network system comprising:

a plurality of subscriber apparatuses which transmit/receive one of a signal having a MAC address added to a packet and a signal having no MAC address added to a packet;

a subscriber multiplexing/demultiplexing apparatus which multiplexes packets in signals transmitted from said respective subscriber apparatuses on the basis of MAC addresses added to the packets or IP addresses of the packets, and demultiplexes an input multiplexed signal into packets on the basis of one of a MAC address added to each packet and an IP address of each packet; and

a protocol termination apparatus which includes a first interface block which interfaces with a backbone network, second and third interface blocks which interface a multiplexed signal with said subscriber multiplexing/demultiplexing apparatus, switching means, and PPP processing means,

wherein said protocol termination apparatus, when a packet in a multiplexed signal received from said subscriber multiplexing/demultiplexing apparatus through said second interface block includes [[is]] a data packet, said protocol termination apparatus causes said switching means to switch to transfer the data packet to said first interface block on the basis of one of a MAC address added to the data packet and an IP address of the packet, and transmits the packet to a backbone network upon converting the packet into a POS signal by using said first interface block, and

when a packet in a multiplexed signal received from said subscriber multiplexing/demultiplexing apparatus through said second interface block includes [[is]] a control packet, said protocol termination apparatus causes said switching means to switch to transfer the control packet to said PPP processing means on the basis of one of a MAC address added to the control packet and an IP address of the packet, and causes said PPP processing means to transmit the received control packet through said third interface block and perform PPP processing with said subscriber apparatus through said subscriber multiplexing/demultiplexing apparatus.

12. (Currently amended) A system according to claim 11, wherein the packet includes ~~[[is]]~~ one of an Ethernet frame packet and an IEEE 802.3 frame packet, the data packet includes ~~[[is]]~~ one of a PPP data packet in the Ethernet frame packet and a PPP data packet in the IEEE 802.3 frame, and the control packet includes ~~[[is]]~~ one of a PPP control packet in the Ethernet packet and a PPP control packet in the IEEE 802.3 frame.

13. (Currently amended) A system according to claim 11, wherein the packet includes ~~[[is]]~~ one of a PPP packet in an Ethernet frame packet and a PPP packet in an IEEE 802.3 frame packet, the data packet includes ~~[[is]]~~ one of a PPP data packet in the Ethernet frame packet and a PPP data packet in the IEEE 802.3 frame, and the control packet includes ~~[[is]]~~ one of a PPP control packet in the Ethernet packet and a PPP control packet in the IEEE 802.3 frame.

14. (Currently amended) An access network system comprising:

a plurality of subscriber apparatuses which transmit/receive one of a signal having a MAC address added to a packet and a signal having no MAC address added to a packet;

a subscriber multiplexing/demultiplexing apparatus which multiplexes packets in signals transmitted from said respective subscriber apparatuses on the basis of MAC addresses added to the packets or IP addresses of the packets so as to output a multiplexed signal as a POS signal, and demultiplexes an input POS signal into packets on the basis of IP addresses of the packets;

an interface which is connected to said subscriber multiplexing/demultiplexing apparatus and transmits a POS signal; and

a protocol termination apparatus which includes a first interface block for interfacing with a backbone network, second and third interface blocks connected to said interface to interface a multiplexed signal with said subscriber multiplexing/demultiplexing apparatus, switching means, and PPP processing means,

wherein, ~~said protocol termination apparatus~~ when a packet in a multiplexed signal received from said subscriber multiplexing/demultiplexing apparatus through said second interface block includes ~~[[is]]~~ a data packet, said protocol termination apparatus causes said switching means to switch so as to transfer the data packet to said first interface block on the basis of an IP address of the data packet, and transmits the packet to the backbone network upon converting the packet into a POS signal by using said first interface block,

when a packet in a POS signal received from said subscriber multiplexing/demultiplexing apparatus through said second interface block includes ~~[[is]]~~ a control packet, said protocol termination apparatus causes said switching means to switch so as to transfer the control packet to said PPP processing means on the basis of an IP address of the control packet, and causes said PPP processing means to transmit the received control packet through said third interface block and perform first PPP processing as PPP processing between said subscriber apparatuses through said subscriber multiplexing/demultiplexing apparatus, and

said protocol termination apparatus transmits a control packet through said second interface block to perform second PPP processing as PPP processing between said protocol termination apparatus and said subscriber multiplexing/demultiplexing apparatus.

15. (Currently amended) A system according to claim 14, wherein the packet processed by said subscriber apparatus and the packets multiplexed by said subscriber multiplexing/demultiplexing apparatus include one of ~~[[are]]~~ Ethernet frame packets and ~~[[or]]~~ IEEE 802.3 frame packets, and the packets demultiplexed by said subscriber multiplexing/demultiplexing apparatus and the packet processed by said protocol termination apparatus include ~~[[are]]~~ PPP packets in PPP packet in PPP packets in an SDH/SONET frame transmitted over a POS signal.

16. (Currently amended) A system according to claim 14, wherein each of the packets ~~packet~~ processed by said subscriber apparatus and the packets multiplexed by said subscriber multiplexing/demultiplexing apparatus includes ~~[[is]]~~ a packet selected from the group consisting of an Ethernet packet, an IEEE 802.3 packet, and a PPP packet in the packet, and one of Ethernet frame packets and ~~[[or]]~~ IEEE 802.3 frame packets, the packets demultiplexed by said subscriber multiplexing/demultiplexing apparatus and the packet processed by said protocol termination apparatus include ~~[[are]]~~ PPP packets in PPP packet in PPP packets in an SDH/SONET frame transmitted over a POS signal.

17. (Original) A multiplexing/demultiplexing apparatus which is connected to each communication signal transmitting section, multiplexes communication signals received from said communication signal transmitting sections, transmits a multiplexed signal to a multiplexed signal receiving section, demultiplexes a multiplexed signal received from said multiplexed signal transmitting section, and transmits demultiplexed communication signals to a communication signal receiving section, comprising:

first address extracting means for extracting an identification address, for each of the communication signals, which is added to a communication signal received from each of said communication signal transmitting sections and preassigned to a predetermined signal identifying section through which the communication signal passes in a multiplexing system including said communication signal transmitting section and said multiplexed signal receiving section;

multiplexing means for multiplexing the received communication signals on the basis of the identification address of each of the communication signals which is extracted by said first address extracting means, and transmitting the multiplexed signal to said multiplexed signal receiving section;

second address extracting means for extracting an identification address, for each of the communication signals, which is added to each of the communication signals in the multiplexed signal received from said multiplexed signal transmitting section and preassigned to a predetermined signal identifying section through which a communication signal passes in a demultiplexing system including said multiplexed signal transmitting section and said communication signal receiving section; and

demultiplexing means for demultiplexing the multiplexed signal into the respective communication signals on the basis of the identification addresses of the respective communication signals which are extracted by said second address extracting means, and transmitting demultiplexed communication signals to said communication signal receiving section.

18. (Currently amended) An apparatus according to claim 17, wherein the communication signal includes [[is]] one of an Ethernet frame packet and an IEEE 802.3

frame packet, and the identification address supplied from said first address extracting means to said multiplex means includes [[is]] a MAC address.

19. (Currently amended) An apparatus according to claim 17, wherein the communication signal includes [[is]] a PPP packet in an Ethernet frame packet or an IEEE 802.3 frame packet, and the identification address supplied from said first address extracting means to said multiplex means includes [[is]] a MAC address.

20. (Original) A multiplexing/demultiplexing apparatus including first receiving means provided for each subscriber apparatus and connected to a first communication path through which a packet output from said subscriber apparatus is transmitted, first transmitting means for transmitting a multiplexed signal to a first multiplex communication path, second receiving means connected to a second multiplex communication path through which a POS signal obtained by multiplexing packets addressed to said respective subscriber apparatuses is transmitted, and second transmitting means for transmitting each demultiplexed packet to a corresponding second communication path, comprising:

first address extracting means, connected to said first receiving means, for extracting a MAC address of each of the packets which is added to a packet received by said first receiving means;

multiplexing means for multiplexing the packets received by said respective first receiving means on the basis of the MAC addresses of the respective packets which are extracted by said first address extracting means, and outputting the packet;

second address extracting means, connected to said second receiving means, for extracting IP addresses of the respective packets from the packets in the POS signal received through said second receiving means; and

demultiplexing means for demultiplexing each packet in the POS signal into the packets for said respective subscriber apparatuses on the basis of the IP addresses of the respective packets which are extracted by said second address extracting means, and outputting the packets to said second transmitting means.

21. (Currently amended) An apparatus according to claim 20, wherein the packet includes ~~[[is]]~~ one of an Ethernet frame packet and an IEEE 802.3 frame packet.

22. (Currently amended) An apparatus according to claim 20, wherein the packet includes ~~[[is]]~~ one of a PPP packet in an Ethernet frame packet and a PPP packet in an IEEE 802.3 frame packet.

23. (Currently amended) A protocol termination apparatus including a first interface block which converts a data packet into a POS signal and transmits the signal to a backbone network, a second interface block which is connected to a subscriber multiplexing/demultiplexing apparatus to which a subscriber apparatus is connected, and receives a transmitted multiplexed signal obtained by causing said subscriber multiplexing/demultiplexing apparatus to multiplexed signals which serve to transmit packets created for the respective subscriber apparatuses and are received from the subscriber apparatuses, and a third interface block connected to said subscriber multiplexing/demultiplexing apparatus, comprising:

said second interface block which extracts the packet and the MAC address added to one of the packet and [[or]] an IP address of the packet from the multiplexed signal;

PPP processing means which is connected to said subscriber multiplexing/demultiplexing apparatus through said third interface block and performs PPP processing between the subscriber apparatuses through said subscriber multiplexing/demultiplexing apparatus; and

switching means for, when a packet extracted by said second interface block includes [[is]] a data packet, transferring the data packet to said first interface block on the basis of one of the MAC address and [[or]] the IP address of the packet which is extracted by said second interface block, and when a packet extracted by said second interface block includes [[is]] a control packet, transferring the control packet to said PPP processing means on the basis of one of the MAC address and the IP address of the packet which are extracted by said second interface block.

24. (Currently amended) An apparatus according to claim 23, wherein the packet includes [[is]] one of an Ethernet frame packet and an IEEE 802.3 frame packet.

25. (Currently amended) An apparatus according to claim 23, wherein the packet includes [[is]] one of a PPP packet in an Ethernet frame packet and a PPP packet in an IEEE 802.3 frame packet.

26. (Currently amended) A protocol termination apparatus including a first interface block which converts a packet into a POS signal and transmits the signal to a backbone network, a second interface block which is connected, through an interface, to a

subscriber multiplexing/demultiplexing apparatus to which a subscriber apparatus is connected, and receives a transmitted multiplexed signal obtained by causing said subscriber multiplexing/demultiplexing apparatus, which has received signals, from the respective subscriber apparatuses, which are used to transmit packets created by the respective subscriber apparatuses, to multiplex the packets, and a third interface block connected to said subscriber multiplexing/demultiplexing apparatus, said interface being a interface which transmits a POS signal, comprising:

said second interface block which extracts a packet in the POS signal and an IP address of the packet;

PPP processing means, connected to said subscriber multiplexing/demultiplexing apparatus through said third interface block, for transmitting a control packet through said third interface block to perform first PPP processing as PPP processing between the subscriber apparatuses through said subscriber multiplexing/demultiplexing apparatus, and transmitting the control packet through said third interface block to perform second PPP processing as PPP processing with said subscriber multiplexing/demultiplexing apparatus; and

switching means for, when a packet extracted by said second interface block includes [[is]] a data packet, transferring the data packet to said first interface block on the basis of the IP address extracted by said second interface block, and when a packet extracted by said second interface block includes [[is]] a control packet, transferring the control packet to said PPP processing means on the basis of the IP address extracted by said second interface block.

27. (Currently amended) An apparatus according to claim 26, wherein the packet includes ~~[[is]]~~ a PPP packet in a PPP packet in PPP packet in an SDH/SONET frame transmitted over an POS signal.